still some catarrh of the intestine. Patient is well at present and enjoys normal appetite and good digestion. A large bougie is introduced from time to time. C. J. COLLES.

OSTEOCLASIS.[1]

(Continued from Vol. IV., p. 421).

Collin's apparatus. The first instrument invented by M. Collin (in 1879) made use of the leverage of the leg in order to break the femur. It had consequently the fault of exerting its strength on the ligaments of the knee, and has given place to another form, produced according to Pousson, after M. Collin had seen how M. Robin had avoided this defect. It is, therefore, not necessary to describe Collin's first apparatus in this article. Nevertheless, very good results were obtained by this machine, including the successful breaking down of a malunited Pott's fracture. Pousson gives an illustration of the osteoclast of Taylor, of New York, and compares it with Collin's first apparatus. It, however, obviously works with much less leverage, and could be made to break the femur near either extremity without straining the ligaments of the knee. No statements are made as to its safety or danger.

Robin's apparatus. Its great merit is that it reduces to a minimum the length of leverage required and thus, for example, enables the surgeon to break the femur just above the condyles without throwing the slightest strain on the knee. Therefore, in producing his osteoclast, M. Robin solved the main problem in connection with instrumental osteoclasis.

Robin's apparatus consists of a wooden plank to support the thigh (the patient lies on his back), of a metal plate to lie on the front of the thigh, and therefore slightly gutter-shaped with the concavity on the lower surface (that which touches the thigh), of two steel bands or hoop-segments, of four screws, of a leather collar and a lever.

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[1] *De L'Ostéoclasie*, par le Docteur Alfred Pousson, Paris, J. B. Baillière et fils. Paris, 1886.

The plank is placed on the table in such a way that the whole length of the femur lies upon it, the patient being on his back. This disposition is absolutely necessary, for, otherwise, a movement of rotation and a consequent oblique fracture may be expected at the moment of operation. The plank is in two parts which can be approached or separated so as to adapt the appliance to thighs of different lengths. The plank is padded with leather, especially at the upper and lower edges. The upper (steel) plate or gutter is similarly padded. It embraces the upper surface of the thigh. It is not much arched downwards at the sides, lest it should interfere with the lateral expansion of the soft parts and imprison the limb too tightly.

The steel hoop-segments are placed across the steel plate, one near each end, and are then screwed down to the plank by four perpendicular screws. In this way the thigh is fixed between the wooden plank below and the steel plate above. The screws are driven home by a key, which has a spring near the handle so arranged as to indicate when the screw force used is sufficient, but not dangerous.

It is *absolutely necessary to screw the plate firmly down on the thigh and thus fix the latter absolutely.* Otherwise, a neat and precise fracture at the exact spot desired cannot be expected.

The compression process above described forces the artery and the sciatic nerve towards the inner side of the femur and does not compress either.

The knee must be extended before the screws are tightened, otherwise the skin will be dragged on.

The leather collar is placed on the condyles, and its extremities, pierced with eyelet-holes, are hooked on to the runner of the lever. The collar should be short, and the lever thus brought as near to the patella as possible.

The popliteal vessels lie snugly between the condyles, safe from pressure.

Having thus adjusted each part of the apparatus, the surgeon seizes the lever and produces a succussion (secousse), continuous for a few seconds, rather than violent, for he otherwise might exceed the degree of force just necessary to determine complete fracture.

As soon as ever the fracture is completed the limb must be freed. A simple mechanism premits this to be done in a moment.

Passing to the new osteoclasts, the author gives a number of experiments, nineteen in all, made by Demons, of Bordeaux, and by himself upon the femora of adult subjects, with Robin's apparatus. All these tended strongly to prove the precision, safety and high value of the procedure. It is true one serious accident occurred, namely, tearing away the anterior crucial ligament from the condyle. But the experimenter blames his own inexperience for this (it was his second experiment), and the series as a whole tends to show that with experience in the use of the machine, came wonderful precision and neatness in the place and character of the fracture.

Four experiments of fracture of the leg by Robin's osteoclast are given. The first produced disastrous results, the second was less mischievous, the third and fourth were very successful. The author attributes these various results to the proper use of padding in the latter cases, and to the neglect of it in the former.

Satisfactory experiments on the lower end of the radius are also described.

A very favorable account is also given of the results produced by Collin's osteoclast (his new form). This chiefly contrasts with Robin's in that it acts sideways while the latter breaks from antero-posteriorly.

After-treatment, *sequæla and accidents* of the operation.

M. Robin does not rectify the position of the broken bone until six or eight days after osteoclasis. During the first week a splint is applied molded to the limb in its deformed state before operation. "Thanks to this mode of proceeding," we are told, "rupture and stripping up of the periosteum, and, consequently, general and local reactions (fever, pain, swelling, hydrarthrosis), are avoided."

Quite exceptionally, after the application of Collin's apparatus, Mr. M. Reclus, Gillette and Verneuil have observed the appearance of a small, grayish and numb spot in the skin, which, however, never mortified. Billroth once noticed temporary paralysis of the external popliteal.

Serious injuries to the joints, *e. g.*, relaxation of ligaments, hydrarthrosis, have occurred, but less frequently than the above related experiments on the dead body might lead one to expect.

In a small minority of cases there is a slight febrile reaction after the operation.

Modifications of Robin's machine can be applied to any part of any of the limbs.

When the knee is ankylosed at a right or acute angle and it is desired to break the femur just above the condyles, the limb is placed on its outer side, and the osteoclast, specially modified for the purpose, breaks it from without inwards.

Some excellent cases are given of the correction of mal-united Pott's and Colles's fracture.

Immediate effects of osteoclasis—Anatomical lesions which it causes. The results of M. Aysaguer's numerous experiments on manual osteoclasis are thus summarized: In young children about 2 years old the bones have such flexibility that complete fracture is not generally obtained. They bend and straighten again like a fresh branch of a tree, and there is no solution of continuity in the periosteum. There is "infraction," not true fracture. Above 4 or 5 years of age there is almost always rupture of the periosteum and true fracture. This fracture is always simple, generally transverse, slightly dentated. The peripheral soft parts are constantly uninjured, presenting neither ecchymoses nor bruises. The rupture of the bone (the tibia) always takes place at the spot where the thumbs (on the knee, if it be used) are applied. In half the cases the fibula gave way exactly at the same level as the tibia. In the others it was produced one or two centimeters above or below. But these observations apply to osteoclasis of the diaphyses. When the manual *brisement forcé* is applied with a view to curing genu valgum the anatomical lesions are very variable and sometimes considerable to an alarming extent. At all events, such is the case where the patients are passed the age of childhood. M. de Santi experimented on subjects between 18 and 22 years of age, and in 12 limbs, there was no epiphysal separation, but nine times rupture or detachment of the external lateral ligament, and twice a bit of the condyle was torn away with it. Once the condyle was broken away bodily, making a fracture into the joint.

Collin's first apparatus was effective in separating the epiphysis even in adolescents from 14 to 20 years of age, but it produced other lesions, considerable and even alarming. Even the semi-lunar cartilages have been displaced by it.

There is not unfrequently intense pain for from twenty-four to forty-eight hours after the operation. It often coincides with hydrarthrosis. Both soon disappear.

Before the use of the new osteoclasts one or two very serious cases of arthritis and periostitis were reported. Loose joint has also resulted, and even one pseudarthrosis (Boeckel). In the last case the parents removed the splints in the fifth week, and may, therefore, be blamed for the evil result.

Then follows an excellent chapter containing numerous statistical facts respecting the application of osteoclasis to mal-united fractures. This chapter concludes, however, with a valueless and narrow comparison of osteoclasis with osteotomy which, for example, quite fails to take into account that osteotomy has often been only undertaken after osteoclasis has failed.

The number of osteotomies taken for comparison is 37; of these 7 were attended with abundant suppuration or erysipelas.

I will only remark that I have myself done eleven antiseptic osteotomies for mal-united fracture, and should have been grieved and surprised to have seen one suppurate.

Valuable tables of cases of osteoclasis are added.

Osteoclasis applied to the treatment of rachitic curvatures.

M. Pousson, after discussing the indications for osteoclasis in these affections, compares it with osteotomy for the same diseases, somewhat to the advantage of the latter. He gives 98 "osteoclases" without a death, and, indeed, without any serious complication.

M. Delens, who had given up osteoclasis for MacEwen's osteotomy, has now, after seeing and using Collin's osteoclast (second form), given up osteotomy in favour of machine osteoclasis. Even Demons (of Bordeaux) the French translator of MacEwen's book, has been converted from the advocacy of osteotomy for genu valgum to that of osteoclasis.

That theoretically possible accident, arrest of growth as a consequence of injury to the epiphyseal cartilage, has not once been observed.

There is a dearth of observations made *years* after osteoclasis. Lannelongue says that cases operated on in the old way afterwards suffered from an extreme sensitiveness in the knee-joint to changes of temperature and a tendency to the formation of osteophytes at the line of fracture or epiphyseal separation.

The duration of treatment is somewhat long after manual osteoclasis of adults owing to the sprain, etc., inflicted on the joint.

The force required to break a bone has by no means any fixed relation to the age and strength of the patient.

The new machine osteoclases contrast with the old notably in that only a small minority of the former, but the large majority of the latter suffer from lively and prolonged pains in the neighbouring joint after operation.

Consolidation and bony union take place as quickly after the new mode of osteoclasis as after a simple transverse fracture caused by accident. Age has a considerable influence on this process. The younger the patient the more rapid the union.

Two, three or four weeks more, generally, suffice for complete recovery of the strength and suppleness of the limb.

In comparing osteoclasis for genu valgum with MacEwen's osteotomy, M. Pousson regards both as absolutely without danger. He points out that as osteoclasis requires complicated apparatus, many surgeons, especially those resident in remote districts, will prefer osteotomy. He concludes, from a study of the cases recorded, that convalescence and complete functional restoration of the limb are notably quicker after osteoclasis by the new machine method than after MacEwen's osteotomy.

Osteoclasis applied to the treatment of ankylosis and of some other articular affections.

M. Pousson analyzes 36 osteoclases of this class, of which 18 were of the hip, and 14 of the knee. He says that the orthopædic results were:

Perfect in	24
Satisfactory in	3
Tolerably satisfactory in	1
Bad in	2

The original affections leading to the ankylosis were:

	Times.
Traumatic arthritis	5
Tubercular "	7
Puerperal "	2
Scarlatinal "	2
Typhoid "	1
Epiphyseal "	1
Rheumatic "	1
Suppurating "	4
Indetermined "	10

In none of these cases did osteoclasis produce any relapse, although in one case, originally a traumatic arthritis, where the splints, etc., were removed too hastily, a violent inflammation resulted. But this did not attack the joint itself, only the seat of osteoclasis. Two or three years had usually elapsed between the date of the original disease and that of operation. All the patients were adolescents or more or less young adults.

When an ankylosis is at a too acute angle for one osteoclasis to remedy it satisfactorily, Robin suggests two, one above, the other below the joint. The alternative is a cuneiform osteotomy.

M. Pousson's comparison of osteoclasis with osteotomy in this class of affections is like his other similar comparisons, very inferior in value to the rest of his admirable book. He cites only 22 linear osteotomies of the hip, with 2 deaths. Now, I have myself done 22 without any fatality, and all with excellent result, and I expect that Volkmann has done nearly as many, though he prefers the wedge operation. When osteoclasis comes to be done everywhere in isolated cases by surgeons who have had no previous experience of the operation, we may hear of some mischief being done. I consider osteotomy of the hip to be as safe as that of the femur for genu valgum, when the surgeon knows how to do it. M. Pousson, however, comes to the conclusion that it is a very grave business.

I cannot conclude this article without formally offering my thanks to the author of the book under notice for the complete, logical, honest, and altogether excellent manner in which he has laid before the profession an account of what is evidently destined to be a surgical procedure of high value and of frequent applicability. The work is both practical and scholarly.

C. B. KEETLEY.